REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on January 2, 2004, and the references cited therewith. Claims 14-28 are now pending in this application.

Affirmation of Election

As provisionally elected on September 26, 2003, Applicant elects to prosecute the invention of Group III, claims 14-28.

The claims of the non-elected invention, claims 1-13 and 29-41, are hereby withdrawn without prejudice. However, Applicant reserves the right to later file continuation or divisional applications having claims directed to the non-elected inventions.

35 U.S.C §112, Second Paragraph, Rejection

Claims 16 and 23 were rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite for reciting certain structural attributes of the backbone claimed in claims 14, 15 or 22. In particular, claims 16 and 23 state the peptide backbone has a polyproline helix, a short loop region, and an alpha helix, and the peptide backbone folds so that the polyproline helix and the alpha helix hydrophobically interact. Claim 16 depends from claims 14 and 15, whereas claim 23 depends from claims 22. Claims 14 and 15 are directed to a peptide-based reagent comprising a peptide backbone and an interactive domain, where the peptide backbone has at least 90% identity to specific SEQ ID NOs. The language of claim 22 is similar to that of claims 14 and 15.

Indefiniteness depends on whether one of skill in the art would understand the scope of the claim when the claim is read in light of the specification. *North American Vaccine Inc. v. American Cyanamid Co.*, 7 F.3d 1571, 28 USPQ2d 1333 (Fed. Cir. 1993). If the claims read in light of the specification reasonably apprise those skilled in the art of

the scope of the invention, § 112 demands no more. *Miles Laboratories Inc. v. Shandon, Inc.*, 997 F.2d 870, 27 USPQ2d 1123 (Fed. Cir. 1993).

Applicant submits that one of skill in the art would readily understand that the claimed peptide-based reagent has both a backbone and an interactive domain. Moreover, such a skilled artisan would understand that claims 16 and 23 merely define certain desirable attributes of the claimed backbone in greater detail. Contrary to the Examiner's allegation, claims 16 and 23 clearly identify that the peptide backbone, and not the interactive domain, can have a polyproline helix, a short loop region, and an alpha helix. Claims 16 and 23 do not state that these structural attributes are part of the interactive domain. Applicant submits that no ambiguity exists in the language of claims 16 and 23 and requests withdrawal of this rejection under 35 U.S.C. § 112, second paragraph.

Claims 17, 18, 25 and 26 were rejected under 35 U.S.C. § 112, second paragraph, as "more stable" is allegedly indefinite.

Applicant submits that the language of these claims is clear and definite. As described in the Examples (see, e.g., pages 41-44 and 49), the term "more stable" has an exact thermodynamic meaning, which is that a peptide backbone has lower Gibbs free energy than "a peptide having SEQ ID NO:1." This generally means that higher concentrations of urea are needed before the peptide backbone will unfold. For example, as shown in Figures 9 and 11 and described on Page 49, the SAP-2 peptide (SEQ ID NO:21) is more stable than the SAP peptide (SEQ ID NO:11 or 14). Unfolding of the SAP peptide gives rise to a free energy of -3.1 kcal/mol, while SAP-2 is 2.1 kcal/mol more stable. This means that while the SAP peptide unfolds in about 2.5 M urea, 4.05 M urea is required for unfolding the SAP-2 protein. As described at pages 13-15 of the application, SAP peptides with SEQ ID NOs: 11 or 14 are peptide backbones without any interactive domain. In contrast, as described on pages 22-23 and 40 of the application, the SAP-2 peptide has an interactive domain (PYRIRF, SEQ ID NO:15) that allows SAP-2 to bind to trypsin. This means that the insertion of such a trypsin-binding interactive domain into the peptide backbone actually stabilizes the peptide-based reagent.

Moreover, even if SEQ ID NO:1 is exceptionally stable (Bjornholm, 1993, first paragraph), it does not follow that other sequences could not be more stable than SEQ ID NO:1. Applicants chose Avian Pancreatic Protease (SEQ ID NO:1) precisely because of its exceptional stability, particularly for the size of the protein. Indeed, avian pancreatic protease is one of the smallest known natural polypeptides to fold into a stable globular form. Therefore, Bjronholm's statement that "SEQ ID NO:1 is exceptionally stable" does not make the meaning of "more stable" indefinite.

Thus, Applicant submits that the claims are definite and respectfully requests withdrawal of this rejection under 35 U.S.C. § 112, second paragraph.

35 U.S.C. §101 Rejection

The Examiner has rejected claims 14-28 under 35 U.S.C. § 101 as allegedly lacking patentable utility. The claims are drawn to a peptide-based reagent comprising a peptide backbone and an interactive domain, wherein the peptide backbone has at least 90% sequence identity to SEQ ID No. 11.

Applicant submits that specification as filed provides a statement of a specific, credible and substantial utility and clearly explains why the invention is useful. In particular, the specification states at Page 32 that the peptide-based reagents of the invention can substitute for antibodies. As described on page 1 of the application, use of antibodies in many situations is problematic and smaller peptide backbones are needed that do not suffer from the instability, storage and shelf life problems of antibodies. The present peptide-based reagents are highly stable, as illustrated by Figures 10 and 11. As shown in Figure 12 and described on page 50 of the specification, peptide-based reagents of the invention (e.g. SAP-1 and SAP-2) bind to trypsin. Thus, such peptide-based reagents can be used in the same manner that antibodies would be used for detecting the presence or absence of trypsin in a sample by monitoring whether SAP-1 or SAP-2 bind to trypsin molecules in the sample. Hence, the specification clearly identifies a specific, credible and substantial utility for the present peptide-based reagents.

Applicant also submits that a person having ordinary skill in the art would easily recognize that the peptide-based reagents of the invention have utility, for example, as

antibody-like molecules that can bind to selected molecules. For example, other workers in this field have sought artificial antibody polypeptides that can be used instead of antibodies for identifying the presence, and quantifying the amount, of selected "antigens" or other molecules. See, U.S. Patent 6,703,199 to Koide, entitled "Artificial Antibody Polypeptides" (a copy of which is provided herewith). The excellent stability (see, e.g., Figures 9-11 of the present application) and the binding properties (see, e.g., Figure 12) of the present peptide-based reagents clearly demonstrate that the claimed reagents have a credible utility – they can be substituted for antibodies. One of skill in the art would readily understand and appreciate the utility of such peptide-based reagents.

Applicant further submits that many other utilities exist for the present peptide-based reagents, in addition to their utility as antibody-like reagents. However, as described in the Revised Interim Utility Guidelines Training Materials published on the uspto.gov website, only a single utility is needed.

Applicant further reminds the Examiner that "[t]he threshold of utility is not high: An invention is 'useful' under section 101 if it is capable of providing some identifiable benefit." *Brenner v. Manson*, 383 U.S. 519, 534, 148 USPQ 689 (1966); *Brooktree Corp. v. Advanced Micro Devices, Inc.*, 977 F.2d 1555, 24 USPQ2d 1401 (Fed. Cir. 1992).

Thus, Applicant submits that the claimed invention has a specific, substantial and credible utility and respectfully requests withdrawal of this rejection under 35 U.S.C. §101.

35 U.S.C. §112, First Paragraph Rejection

The Examiner has rejected claims 14-28 under 35 U.S.C. § 112, first paragraph, as allegedly unsupported by a specific and substantial utility. The claims are drawn to a peptide-based reagent comprising a peptide backbone and an interactive domain, wherein the peptide backbone has at least 90% sequence identity to SEQ ID No. 11. According to the Examiner, because the claims allegedly lack utility, one of skill in the art would not know how to use this invention.

The Examiner has the initial burden of challenging an asserted utility. Only after the examiner has provided evidence showing that one of ordinary skill in the art would

reasonably doubt the asserted utility does the burden shift to the applicant to provide rebuttal evidence sufficient to convince one of ordinary skill in the art of the invention's asserted utility. *In re Swartz,* 232 F.3d 862, 863, 56 USPQ2d 1703, 1704 (Fed. Cir. 2000); *In re Brana*, 51 F.3d 1560, 1566, 34 USPQ2d 1436, 1441 (Fed. Cir. 1995) (citing *In re Bundy*, 642 F.2d 430, 433, 209 USPQ 48, 51 (CCPA 1981)).

Applicant submits that the Examiner has not carried this burden. As described above, the specification as filed provides a statement of a specific, credible and substantial utility and clearly explains why the invention is useful. For example, the peptide-based reagents of the invention have utility as antibody-like reagents. The excellent stability (see, e.g., Figures 9-11 of the present application) and the binding properties (see, e.g., Figure 12) of the present peptide-based reagents clearly establish the credibility of this utility. The utility is well established, as indicated by workers in the field who have sought other types of antibody-like polypeptides (see, U.S. Patent 6,703,199 to Koide, entitled "Artificial Antibody Polypeptides"). Hence, no reasonable basis exists for the Examiner's assertions of a lack of utility. Applicant therefore submits that the burden still resides with the Examiner to establish a prima facie case that one of skill in the art would reasonably doubt the asserted utility.

The Examiner has also alleged that the specification does not teach how to use the invention because the claims are directed to peptide-based reagents with peptide backbones having at least 90% sequence identity to SEQ ID No. 11 and the specification does not specify core structures needed to carry out the alleged unspecified utility.

Applicant asserts that while "the specification must teach those skilled in the art how to make and use the full scope of the claimed invention without 'undue experimentation,'" not everything necessary to practice the invention need be disclosed, and in fact, what is well-known is best omitted. *In re Wright,* 999 F.2d 1557, 1561, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993); *In re Buchner*, 929 F.2d 660, 661, 18 USPQ2d 1331, 1332 (Fed. Cir. 1991). All that is necessary is that one skilled in the art be able to practice the claimed invention, given the level of knowledge and skill in the art. Furthermore, the scope of enablement must only bear a "reasonable correlation" to the

scope of the claims. See, e.g., *In re Fisher*, 427 F.2d 833, 839, 166 USPQ 18, 24 (CCPA 1970).

The present application as filed fulfills this requirement of teaching one of skill in the art to practice a reasonable correlation of the scope of the claimed invention. In particular, the specification teaches that the peptide backbone should be stable and provides ways to make stable peptide backbones and then confirm their stability by testing it. See, e.g., Pages 13-23 and the Example at Pages 41-44 and 49. The specification provides a teaching on what types of amino acids can be substituted for amino acids already present in SEQ ID NO:11. See Pages 14-22. After such substitutions, the peptide backbones can be tested to ascertain whether the desired stability is reduced or enhanced using the methods described in the application. See, e.g. Example at Pages 41-44 and 49.

Moreover, Applicant submits that a claim scope that encompasses peptide backbones having at least 90% sequence identity with SEQ ID No. 11 is not overly broad. For example, SEQ ID NO:11 has just thirty six amino acids. Hence, a 10% change in sequence is a change of only about 3-4 amino acids. Given that the specification provides clear teachings on what structural features are desirable in the peptide backbones, for example, a polyproline helix, a short loop region, and an alpha helix, and the teaching that the peptide backbone folds so that the polyproline helix and the alpha helix hydrophobically interact, one of skill in the art would clearly be able to identify which amino acid changes can and cannot be made. This is particularly true in view of the methods provided in the specification for testing whether the peptide backbones retain their stability and structural characteristics.

Thus, Applicant submits that the claimed invention has a specific, substantial and credible utility and that the specification teaches how to use the claimed invention to achieve this utility. Applicant respectfully requests withdrawal of this rejection under 35 U.S.C. §112, first paragraph.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is respectfully requested. The Examiner is invited to telephone Applicant's attorney (516) 795-6820 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743

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CERTIFICATE UNDER 37 CFR 1.8: *The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313, on this 24 day of March, 2004.*

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